is made to the sequence of FIGS. 2–4 in reverse. Starting with FIG. 4, the cleaning liquid container 24 is initially filled with a cleaning liquid such as an acid cleaner. The piston 40 rests against the pumping water opening end 38 of the cleaning liquid container. The cleaning liquid container 24 may contain, for example, a 5 liter volume of acid cleaning liquid. Prior to each water sample collecting cycle, the pump 12 is reversed for an increment of time pushing the piston 40 an increment of distance along the length of the cylindrical cleaning liquid container 35. The piston 40 gradually makes its way toward the cleaning liquid opening end 36 of the cleaning liquid container 24 as shown in FIG. 3. The piston 40 finally reaches the cleaning liquid opening end at the end of all the water sampling events and at the end of the current life cycle of the WSS. Thus the cleaning liquid container 24 contains sufficient cleaning liquid for flushing biofouling material from the intake line 15 prior to each water sampling event for the entire forty-eight water sampling events of the multiport valve 14 and WSS 10 of FIG. 1.

Similarly the flushing liquid container 25 is filled with distilled water so that the piston 40 rests against the pumping water opening end 38 of the flushing liquid container 25 as shown in FIG. 4. After cleaning away any biofouling material from the intake line 15 using the acid cleaning liquid from cleaning liquid container 24, the multiport valve 14 under control of the programmable controller closes the cleaning liquid container 24 by closing the respective port 16 and port inlet 18 while opening the respective port 16 and port opening 18 for the flushing liquid container 25. The pump 12 operating in reverse pumps and pushes the piston 40 an increment of distance along the cylindrical container 35 of the flushing liquid container 25 for flushing away acid cleaning liquid from the intake line 15. Over the forty-eight water sampling events and the life cycle of the particular WSS the piston 40 within the flushing liquid container 25 gradually works its way toward the flushing liquid opening end 36 as shown in FIG. 3 and FIG. 2, viewing the sequence in reverse from FIG. 4, to FIG. 3, to FIG. 2.

A preferred example implementation of the multiport valve assembly 14 is illustrated in FIG. 5, The multiport valve 14 is formed with a single valve head 50 and multiport valve body 52 which remain in stationary position relative to the water sampling system 10. A central coaxial rotating drive shaft 54 rotates within the valve head 50 and valve body 52 and is driven by stepper motor 55. The rotating drive shaft 54 turns a distributor rotor 56 formed with a radial coupling channel 58 to provide valve couplings in the valve head 50 between the single intake line 15 and multiple port inlets 18 and ports 16.

As shown in FIG. 5 the valve head 50 is formed with a single intake line 15 which may be coupled to any of the fifty port inlets 18 and respective ports 16 for coupling to the respective forty-eight water sample receivers 22, single cleaning liquid container 24 and single flushing liquid container 25.

The single intake line 15 is coupled to any one selected port 16 by the selected rotational position of the fluid distributor rotor 56 which is tied to the rotating shaft 54. The rotor 56 is formed with a bearing face 60 which bears against a complementary bearing face 62 of the valve head 50. The rotor 56 is formed with a radial coupling channel 58 which makes the fluid connection or coupling between the intake line 15 and a selected port inlet 18 and port 16.

To understand operation of the multiport valve head 50 and distributor rotor 56 of the multiport valve assembly 14 shown in FIG. 5, reference is made to FIGS. 6 and 7, FIG. 6 is a partial cross section through the top of the multiport valve 14 in the direction of the arrows on line 6—6 of FIG. 5, FIG. 6 therefore illustrates the respective bearing surface 60 of the multiport valve head 50,

As shown in FIG. 6 the single intake line 15 is coupled to an elongate inlet channel 70 in the configuration of a circular groove 70 concentric with the driven rotating shaft 54. The fifty ports 16 terminate in a ring of fifty holes forming an outer ring 72 concentric with and outside the inner circular groove 70.

FIG. 7 illustrates the bearing surface 62 of the distributor rotor 56. As noted above the rotor 56 rotates with the rotating shaft 54 while the valve head 50 and valve body 52 remain stationary relative to the rotating shaft 54 and rotor 56. The bearing face 62 of rotor 56 is formed with a radial coupling channel 58 in the configuration of a short length of a radial groove having dimensions and radial position for extending a coupling channel between the inner ring circular groove 70 and the outer ring of port holes 16 on the bearing face 60 of the valve head 50. Thus, the radial groove coupling channel 58 is positioned for making selected couplings in a time series sequence between the continuous elongate circular channel 70 coupled to the single intake line 15 and selected port inlets 18 and ports 16 of the outer circle 72. This is accomplished in a controlled sequence determined by instructions from the programmable controller hereafter described.

With respect to construction features of the multiport valve 14 of FIGS. 5–7, the multiport valve head 50 and valve body 52 can be constructed for example from relatively hard Delrin TM plastic. On the other hand the rotor 56 is constructed for example of a softer Teflon TM plastic. The relatively softer and relatively harder flat bearing surfaces 60,62 provide a good seal between the bearing surfaces, sealing off the unused ports 16 of the multiport valve head. Instead of plastic, other materials may be used for the valve head 50 and rotor distributor 56 such as ceramic and graphite materials. More important than the particular materials and relative hardnesses, however, the bearing surfaces are formed with flat faces to achieve the desired sealing engagement.

In order to maintain appropriate pressure between the bearing faces 60,62, the distributor rotor 56 is mounted on shaft 54 with a compression Inconel X750 TM alloy spring 75. The alloy spring 75 is mounted around the rotating shaft 54 bearing against the rotor 56 and a bearing plate 76 of the valve body 52. The spring 75 is selected for example to have a 100 pound spring force assuring a sealing coupling between the bearing surfaces. Various seals throughout the multiport valve are provided by the use of O ring seals 78 at various locations.

With respect to further details of construction, the stepper motor 55 is housed within an oil filled cavity defined by stepper motor housing 80 also constructed from Delrin TM plastic material. The oil filled cavity is also partly defined by an oil bladder or oil diaphragm 82 which is sealed to the external water or other fluid. The diaphragm 82 and oil filled cavity provide pressure compensation for the housing 80 for pressure fluctua-